The progress of knowledge has brought us to a point where our nation needs the services of a body of men who shall be engaged in work of a distinctively different type from that carried on in our traditional institutions of learning, a work which belongs peculiarly to the present and future, because it was not possible in the past. Looking at our intellectual history, we have grown from the high school of our revolutionary ancestors to the college; from the college stage we have grown to the university stage. Now we have grown to a point where we need something beyond the university. We want an institution at the city of Washington at which shall be organized a system of research on that higher plane and larger scale which the progress of experimental science and observational knowledge now requires. Such a work would be at a disadvantage in being connected with any existing university for the same reason that the college was at a disadvantage when grafted on the preparatory school, and for the same reason that our universities are now at a disadvantage in being grafted upon the colleges. What we want might be appropriately called the National Research University. If the Carnegie Institution is not to grow into anything of this kind, is there not among us some possessor of great wealth ready to become its founder?—Professor Simon Newcomb in *The North American Review*.

EXPERIMENTS IN FLYING.

IN October last we resumed the trials on the Kill Devil practice ground with the machine which we had used during the previous year, and succeeded in making flights in which the operator remained in the air over a minute, at one time being suspended 1 minute 11.80 seconds. While carrying on the experiments, our power machine was under construction. In dimensions it measures a little over 40 feet from tip to tip of the wings, of which there are a pair. Its length fore and aft, to use a nautical phrase, is about 20 feet, and the weight, including that of the operator, as well as the engine and other machinery, is slightly over 700 pounds. We designed the machine to be driven by a pair of aerial screw propellers placed just behind the main wings. One of the propellers was set to revolve vertically and intended to give a forward motion, while the other underneath the machine and revolving horizontally, was to assist in sustaining it in the air.

We decided to use a gasoline motor for power, and constructed one of the 4-cycle type, which, revolving at a speed of 1,200 revolutions a minute, would develop 16 brake horsepower. It was provided with cylinders of 4-inch diameter and having a 4-inch stroke and intended to consume between 9 and 10 pounds of gasoline an hour. The weight of the engine, including the wheel, is 152 pounds.

We had calculated that this amount of mechanical power would be sufficient to maintain the machine in the air, as well as to propel it, the calculations being the result of gliding experiments, which showed that when the wind was blowing at a rate of 18 miles an hour the power consumed in operation was equal to 1.5 horse-power, while with a wind of 25 miles an hour it represented 2 horse-power, being capable of sustaining a weight of 160 pounds per horse-power at the 18-mile rate.

After the motor device was completed, two flights were made by my brother and two by myself on December 17 last. The apparatus had been placed on a single rail track, built on the level, the track supporting it at a height of eight inches from the ground. It was moved along the rail by the motor, and after running about 40 feet ascended into the air. The first flight covered but a short distance. Upon each successive attempt, however, the distance was increased, until at the last trial the machine flew a distance of a little over a half mile through the air by actual measurement. We decided that the flight ended here, because the operator touched a slight hummock of sand by turning the rudder too far in attempting to go nearer to the surface. The experiments, however, showed that it possessed sufficient power to remain suspended longer if desired. According to the time taken of each flight a speed varying from 30 to 35 miles an hour was attained in the air.

We should have postponed these trials until the coming season, but for the fact that we wished to satisfy ourselves whether the ma-

chine had sufficient power to fly, sufficient strength to withstand the shock of landing, sufficient capacity to control. Winter had already set in when the last trials were made, but these facts were definitely established, and we know that the age of the flying machine has come at last.—Wilbur Wright in *The Independent.*

NOTES ON INORGANIC CHEMISTRY.

Two papers have recently appeared in this country which, while not directly concerned with inorganic chemistry, have an important bearing on it. The first of these is a 'New Method for Determining Compressibility,' by Theodore William Richards and Wilfred Newsome Stull, and is published by the Carnegie Institution. Very little work has been previously done on the compressibility of inorganic substances, although such investigations are calculated to throw light upon the subjects of chemical affinity and cohesion. New methods have been devised by which the compressibility of nearly all solids and liquids can be determined up to 600 atmospheres or more. By means of these methods Richards and Stull have determined the compressibility at 20° of iodin, bromin, carbon tetrachlorid, chloroform, bromoform, water, phosphorus and mercury, while that of chlorin was estimated by extrapolation. Bromin is much more compressible than iodin, and it is probable that chlorin is still more compressible, being rather more than twice as compressible as water. Phosphorus is hardly half as compressible as water, while mercury was the least compressible substance measured, having a value less than ten per cent. that of water. In every case the compressibility decreases with increasing pressure. The authors suggest the use of the term *megabar* to indicate the pressure of a megadyne on a square centimeter, giving an absolute standard instead of the unscientific unit of an atmosphere. The value of a megabar is 75.015 centimeters of mercury or 98.703 per cent. of an 'atmosphere.' This the authors point out is more nearly the average pressure at the laboratories of the world than the arbitrary 'atmosphere' usually taken.

The second paper is on 'The Electrical Conductivity of Aqueous Solutions at High Temperatures,' by Arthur A. Noyes and William D. Coolidge. This is the first contribution from the recently established research laboratory of physical chemistry of the Massachusetts Institute of Technology, and concerns the description of the apparatus used and the results with sodium and potassium chlorid up to 306°. Great difficulty was encountered in devising a suitable conductivity cell which should fulfil the other necessary conditions and be capable of withstanding the great pressures at high temperatures. The cell finally found satisfactory was a platinum-lined soft crucible steel cell, with gold wire packing and quartz insulation. In the experiments with sodium and potassium chlorids it was found that the degree of dissociation decreases with the temperature. With tenth-normal solution of sodium chlorid this decrease is very rapid, from about 83 per cent. at 18°, to 60 per cent. at 306°, and indicates that the degree of dissociation is very small at the neighborhood of the critical temperature (about 360°). The conductivity of the vapor over a tenth-normal solution of potassium chlorid at 306° was too small to be observed with the apparatus, and is at all events exceedingly small. The investigations with this cell are being continued and it is hoped to extend the observations up to the critical temperature.

To the 'Quarterly Statement of the Palestine Exploration Fund' a paper is contributed by William Ackroyd on a principal cause of the saltness of the Dead Sea. After showing the insufficiency of the soil and rocks to furnish more than a fraction of the salt present, and that the theory that its saltness is due to its being a former arm of the Red Sea, which has gradually become concentrated, is not substantiated by facts, he claims that the most important cause is the atmospheric transportation of salt from the Mediterranean. As in other localities, the rain water would be charged with salt to a degree which varies in a direct manner with the velocity of the winds coming from the sea. This view is confirmed by the fact that the ratio of chlorin to bromin is approximately the same as that for these two elements in the Mediterranean.